

IN THE CLAIMS

Claims

1. (currently amended) A printhead for an ink jet printer responsive to control and data signals, comprising:

a plurality of ink ejectors for ejecting ink when actuated;

5 a power circuit for selectively applying power to ~~selected~~ ink ejectors to actuate the ink ejectors and eject the ink;

a control circuit responsive to the data signals for producing control signals for controlling the operation of the power circuit to actuate the selected ejectors based on the data signals;

10 the power circuit having a total resistance and including a compensation circuit having a sub-total resistance included in the total resistance and being controlled by the control circuit for reducing the total resistance of the power circuit in response to the control signals, the compensation circuit having first and second parallel resistance paths and being responsive to the control signals to connect either the first resistance path or both the first and second resistance path to carry power in the power circuit, whereby the

15 sub-total resistance of the compensation circuit is reduced when both the first and second resistance paths are connected to carry power in response to predetermined parameter conditions.

2. (currently amended) The printhead of claim 1 wherein ~~a~~ at least one of the compensation circuits is connected to each one of the ink ejectors and each of the compensation circuits comprises:

5 a first switch in the first parallel resistance path having a first internal resistance and being connected to actuate an associated one of the ink injectors when the first switch is turned on;

a second switch in the second parallel resistance path having a second internal resistance and being connected to actuate the associated ink ejector when the second switch is turned on, said first and second switches being connected in parallel with each

10 other; and

said control circuit being interconnected with said first and second switches for selectively actuating the associated ink ejector by either (1) switching the first switch on or (2) switching the first and second switches on, whereby the resistance of the compensation circuit may be reduced by switching both the first and second switches on
15 as compared to switching on only the first switch.

3. (currently amended) The printhead of claim 1 wherein each compensation circuit comprises:

said ink ejectors being disposed in groups:

a first switch having a first internal resistance and being connected to actuate one
5 associated ink injector when the first switch is turned on;

a second switch having a second internal resistance and being connected to actuate the associated ink ejector when the second of switch is turned on, said first and second switches being connected in parallel with each other; and

said control circuit being connected to selectively turn on the first and second
10 switches, said control circuit being responsive to the data signals to actuate the first switch when only one of the ink ejectors within a defined one of the groups is required to be actuated by the data signals, and to actuate both the first and second switches when a number, more than one, of the ejectors in one of the groups is required to be actuated by the data signals.

4. (original) The printhead of claim 1 wherein each compensation circuit comprises:

X number of switches connected in parallel with each other and connected to actuate an associated ink ejector;

5 said control circuit being connected to control the X number of switches and to selectively actuate the switches said control circuit being responsive to the data signals to actuate a select number of the X number of switches based upon the data signals.

5. (currently amended) The printhead of claim 4 wherein the select number of switches actuated by the control circuit is proportional to the number of ink ejectors ~~that~~

~~will be actuated~~ required to be actuated by the data signals substantially simultaneously within ~~a defined~~ one of the groups.

6. (currently amended) The printhead of claim 4 wherein the select number of switches actuated by the control circuit is proportional to the number of ink ejectors ~~that~~ will be actuated required to be actuated by the data signals substantially simultaneously within ~~a defined~~ one of the groups.

7. (currently amended) The printhead of claim 4 wherein the select number of switches actuated by the control circuit is equal to the number of ink ejectors ~~that will be~~ actuated required to be actuated by the data signals substantially simultaneously within a ~~defined~~ one of the groups.

8. (currently amended) A printer comprising:

a main printer assembly including printer electronics, a media carrier, and a printhead carrier, the printer electronics for producing power signals, control signals and data signals, the data signals corresponding to an object to be printed;

5 a circuit connected to receive the power signals, control signals and data signals from the printer electronics;

a printhead mounted on the printhead carrier and connected to the circuit for receiving the power signals, the control signals and the data signals;

10 a plurality of ink ejectors disposed in the ~~the~~ printhead for ejecting ink when actuated;

a printhead control circuit disposed in the printhead for receiving at least the data signals, ~~the printhead control circuit including~~

logic in the printhead control circuit for receiving at least the data signals and producing printhead command signals based on the data signals;

15 a power circuit for actuating the ink ejectors in response to the printhead command signals, the power circuit including a plurality of compensation circuits for receiving the printhead command signals, each ink ejector being associated with a single one of the compensation circuits, each of the compensation circuits ~~including X-number~~ of at least first and second switches that are connected in parallel with each other, each of

20 the switches in a single one of the compensation circuits being connected to actuate a single associated one of the ink ejectors when the switch is turned on, each of the compensation circuits being responsive to the printhead command signals to actuate a ~~particular number of switches~~ either the first switch or the first and second switch in the compensation circuit to actuate the associated ink injector and eject the ink.

9. (currently amended) The printer of claim 8 wherein the logic is configured to actuate only one switch of the X number of switches in a one of the compensation circuits to actuate a particular one of the ink ejectors when the following conditions exist: (1) the particular ink ejector is associated with a particular one of the power signals and (2) only
5 one of the ink ejectors associated with the particular power signal will be actuated in a predetermined time interval based on the data signals.

10. (currently amended) The printer of claim 8 wherein the logic is configured to determine a select number and actuate a the select number of switches of the X number of switches in a one of the compensation circuits to actuate a the particular ink ejector, the select number being based upon: (1) ~~a~~ the particular power signal with which the
5 particular ink ejector associated, and (2) the number of the ink ejectors associated with the particular power signal that will be turned on in a predetermined time interval based on the data signals.

11. (currently amended) The printer of claim 8 wherein the logic is configured to actuate a plurality of the X number of switches in a one of the compensation circuits to actuate a particular ink ejector when the following conditions exist: (1) the particular ink ejector is associated with a particular power signal and (2) a plurality of the ink ejectors
5 associated with the particular power signal will be turned on in a predetermined time interval based on the data signals.

12. (currently amended) The printer of claim 8 wherein the logic is configured to actuate Y number of switches of the X number of switches in a one of the compensation circuits to actuate a particular ink ejector when the following conditions exist: (1) the particular ink ejector is associated with a particular power signal and (2) a Y number of

- 5 the ink ejectors associated with the particular power signal will be turned on in a predetermined time interval based on the data signals.

13. (currently amended) A printer for printing objects comprising:

- a main printer assembly including printer electronics, a media carrier, and a printhead carrier, the printer electronics for producing M number of power signals, control signals and data signals, the data signals corresponding to ~~an~~ one of the objects to
5 be printed and being configured in including a plurality of address dimensions, the data signals including at least Y number of first dimension signals and Z number of a second dimension signals,
a circuit connected to receive the power signals, control signals and data signals from the printer electronics;
10 a printhead mounted on the printhead carrier and connected to the circuit for receiving the power signals, the control signals and the data signals;
a plurality of ink ejectors disposed in the ~~the~~ printhead for ejecting ink, each ink ejector being uniquely identified with a unique combination of the power signals, the first dimension signals and ~~a~~ the second dimension signals, each power signal being
15 associated with and providing power to a unique group of ejectors;
a printhead control circuit disposed in the printhead for receiving at least the data signals, ~~the printhead control circuit including~~
logic in the printhead control circuit for receiving at least the data signals and producing printhead command signals based on the data signals;
20 a power circuit for actuating the ink ejectors in response to the printhead command signals, the power circuit including a plurality of compensation circuits for receiving the printhead command signals, each ink ejector being associated with a single one of the compensation circuits, each of the compensation circuits including X number of switches that are connected in parallel with each other, each switch in a single
25 compensation circuit being connected to actuate a single associated ink ejector when the switch is turned on, each compensation circuit being responsive to the printhead command signals to actuate a ~~particular~~ number of switches in the compensation circuit to actuate the associated ink injector and eject the ink.

14. (currently amended) The printer of claim 13 wherein the ~~printhead control circuit further comprises~~ logic is configured for determining ~~the~~ a number of switches to be turned on in a predetermined time interval in a particular one of the compensation circuits based upon (1) the ~~particular power signals, associated with the ink ejectors~~ connected to the particular compensation circuit, (2) the particular unique groups of ink ejectors associated with the ~~particular power signals~~, and (3) the number of ink ejectors within one of the ~~particular~~ unique groups that are required by the data signals to actuate within the predetermined time interval.

15. (currently amended) The printer of claim 13 wherein the ~~printhead control circuit further comprises~~ logic is configured for causing the X number of switches to be turned on in a predetermined time interval in a particular one of the compensation circuits where: (1) the particular compensation circuit is within a particular group of compensation circuits, (2) the particular group of compensation of circuits is associated with a particular group of ink ejectors, (3) the particular group of the ink ejectors is associated with a particular one of the power signals, and (4) X is proportional to the number of ink ejectors within the particular group of ink ejectors that are required by the data signals to actuate within the predetermined time interval.

16. (original) The printer of claim 13 wherein the printhead control circuit further comprises logic for causing the X number of switches to be turned on in a predetermined time interval in a particular compensation circuit where: (1) the particular compensation circuit is within a particular group, (2) the particular group of compensation of circuits is associated with a particular group of ink ejectors, (3) the particular group of the ink ejectors is associated with a particular power signal, and (4) X is equal to the number of ink ejectors within the particular group of ink ejectors that are required by the data signals to actuate within the predetermined time.

17. (currently amended) The printer of claim 13 wherein:

there are at least A and B of the power signals, at least two of the first dimension address ~~(P1 and P2)~~ signals (P1 and P2), and at least two of the second dimension address signals; (A1 and A2),

and wherein the power circuit further comprises a first power line for connecting a first group of the ink ejectors to the A power signal and a second power line for connecting a second group of the ink ejectors to the B power signal;

and wherein the control circuit further comprises :

a first AND gate connected to receive the P1 first dimension address signal and the A1 second dimension address signal and produce a first output signal;

a second AND gate connected to receive the P1 and P2 first dimension address signals and the A1 second dimension address signal and produce a second output signal;

a third AND gate connected to receive the P2 first dimension address signal and the A1 second dimension address signal to produce a third output signal;

a fourth AND gate connected to receive the P1 and P2 first dimension address signals and the A1 second dimension address signal to produce a fourth output signal;

a fifth AND gate connected to receive the P1 first dimension address signal and the A2 second dimension address signal and produce a fifth output signal;

a sixth AND gate connected to receive the P1 and P2 first dimension address signal and the A2 second dimension address signal and produce a sixth output signal;

a seventh AND gate connected to receive the P2 first dimension address signal and the A2 second dimension address signal to produce a seventh output signal;

~~an eighth AND gate connected to receive the P1 and P2 first dimension address signals and the A2 second dimension address signal to produce an eighth output signal;~~

an eighth AND gate connected to receive the P1 and P2 first dimension address signals and the A2 second dimension address signal to produce an eighth output signal;

and wherein the ink ejectors and the power circuit further comprise at least 1-4 four ink ejectors (herein designated as ejector X where X indicates an ejector number(s) or range of ejector numbers) and 1-8 eight switches (herein designated as switch(es) X where X is a switch number(s) or range of switch numbers), ejectors 1, 2, 3, 4 being connected to switches 1&2, 3&4, 5&6, 7&8, respectively, where each switch will actuate one ink ejector to which it is connected, the 1-8 switches 1-8 being connected to receive the first through the eighth output signals, respectively, with each of the switches being actuated by one of the output signals having a corresponding number, whereby the 1-8 switches 1-8 are selectively actuated by the first through the eighth output signals;

and wherein the ink ejectors 1-4 1-2 are in the first group connected to the A power line and the ink ejectors 5-8 3-4 are in the second group connected to the B power line.

18. (currently amended) The printer of claim 13 wherein:

the power circuit further comprises M power lines for connecting M groups of ink ejectors (including the ejectors 1-4) to the M power signals;

and wherein the control circuit further comprises Q groups of logic gates (including the first AND gate through the eighth AND gate), each logic gate in a group being controlled by combinations of the first and second dimension address signals,

and wherein the ink ejectors further comprise at least Q ink ejectors arranged into M groups of ink ejectors;

and wherein the power circuit further comprises Q groups of switches (including switches 1-8) where each group of switches is connected to and controlled by one of the groups of logic gates, where each of the ink ejectors is connected to a single group of switches, and each switch in a group will actuate the single ink ejector to which it is connected.

19. (currently amended) The printer of claim 13 wherein the control circuit further comprises a counter circuit for counting ~~the number of~~ ink ejectors in each group of ink ejectors that are to be actuated in a particular time interval and producing a count for each group of ink ejectors, the logic gates being responsive to the counts for each

group of ink jets to actuate a particular number of switches in each group of switches to actuate the ink ejectors, the particular numbers being based on the counts.